

**Combinatorial Bidding, Technologically-Biased Service Rules, And
Geographic License Blocks:**

**How T-Mobile and RTG Are Proposing To Deter New Nationwide
Competition Emerging In The AWS-3 Band.**

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Introduction

In an *ex parte* notice filed by counsel for the Rural Telecommunications Group, Inc., (RTG) on December 3, 2008 RTG counsel Caressa D. Bennet

indicated that RTG would be open to the idea of a flexible band plan that would allow a combination of blocks of spectrum to be aggregated in an auction provided certain safeguards are in place for the bidder to opt out of a block if the bidder did not successfully aggregate the needed spectrum....[and] emphasized the need for small CMA sized license areas for the AWS spectrum so that new entrants, as well as small and rural auction participants, would not be precluded from participation in the AWS-3 auction.¹

RTG also endorsed the proposed bandwidth plan discussed by T-Mobile in its November 17, 2008 *ex parte* filing.² The T-Mobile plan proposed a broadband maximization plan using asymmetrical pairing, consisting of 5 MHz of J Block for uplink and a combined 25 MHz for downlink, consisting of 20 MHz of AWS-3 spectrum and 5 MHz of J Block.³

The following study contends:

(1) The T-Mobile broadband maximization plan is a blatant attempt to erect an entry barrier to providers proposing to utilize Time Division Duplex (TDD) technologies in favor of providers, like T-Mobile, who propose to utilize Frequency Division Duplex technologies to provide broadband service, and does so on the false pretext of minimizing interference problems which the FCC itself has found to be spurious. Such entry barriers are fundamentally anti-competitive and are aimed solely at excluding new entrants wishing to provide nationwide service from the AWS-3 auction.

¹ Notice of *Ex Parte* Communication of Rural Telecommunications Group, Inc., WT Docket Nos. 07-195 and 04-356, December 3, 2008.

² *Idem*.

³ Notice of *Ex Parte* Communication of T-Mobile (AWS-3 Broadband Maximization Plan), WT Docket Nos. 07-195 and 04-356, November 17, 2008.

(2) RTG's endorsement of combinatorial bidding, a reversal of its previous, well-taken position opposing combinatorial bidding, threatens a reprise of the disastrous failure of combinatorial bidding rules in Auction 73, which resulted in a loss of nearly a half billion dollars in revenue to the U.S. Treasury. Furthermore, combinatorial bidding is open to blocking strategies which result in economically inefficient allocations and effectively erect barriers to entry to providers seeking to establish a nationwide network.

(3) RTG's advocacy of allocation of a substantial portion of AWS-3 spectrum in CMA-sized units presents a substantial danger of eliminating economies of scale and complementarities available in a single nationwide license without evidence that such an allocation will substantially alter the serious deficit in deployment and quality of service currently suffered by rural areas. Allocating more spectrum in smaller units to inefficient or marginal providers in rural areas, while allowing major providers to cherry-pick more lucrative urban and suburban areas, will not bring broadband to rural America.

I. The T-Mobile Broadband Maximization Plan Erects A Technologically Biased Entry Barrier To Nationwide Competitors Based on Spurious Claims of Interference Minimization.

T-Mobile recent advocacy for its so called "Broadband Maximization Plan" is the carrier's new iteration of its longstanding attempt to persuade the FCC to establish technologically discriminatory downlink-only service rules for the AWS-3 band that would effectively erect a barrier to the entry of broadband providers wishing to compete nationally using this spectrum.⁴ T-Mobile presupposes a frequency division duplex technology and network for AWS-3 rather than the time division duplex ("TDD")

⁴ T-Mobile first raised the issue in Comments of T-Mobile, USA, WT Docket Nos. WT Docket Nos. 07-195 and 04-356, July 25, 2008, 22-24.

technology proposed by TDD proponents, which include Sprint, Intel, Arraycom, M2Z, among others.⁵

The technical claims of greater efficiency for FDD technology put forward are misleading where not simply false. For example, the comparative advantage table in T-Mobile's filing fails to take note of the fact that TDD requires guard-times rather than guard-bands and, thus, TDD on average "only 3.4% of the available bandwidth is lost to the TX/RX guard-band as compared to FDD."⁶ Furthermore, T-Mobile's submission fails to take notice of the "bursty," asymmetrical character of internet traffic and the superiority of TDD in providing dynamical variation in upstream and downstream carriage rates. Technical and economic efficiencies converge in the hardware requirements of TDD in comparison to FDD:

The cost of duplexers and implementation of RF shielding increases as the guardband or separation of the two channels decreases. With TDD systems, duplexers and isolation techniques are unnecessary since transmit and receive channels within a sector never are active simultaneously and cannot interfere with each other. Consequently, TDD hardware is less complex and less expensive.⁷

In short, T-Mobile's attempt to limit AWS-3 service to FDD is an attempt to suppress a more efficient, highly competitive alternative technology to its own and this is, in itself, inherently anticompetitive.

Finally, the interference minimization rationale of T-Mobile's broadband maximization plan is simply meretricious. The FCC's Office of Engineering and

⁵ See, e.g., NPRM and FNPRM Comments of Arraycom, Inc. WT Docket No. 07-195 and 03-356 (filed December 14, 2007 and July 25, 2008, respectively). See also, Letter from Mike Chartier, on behalf of Intel Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 07-195 and 04-356 (filed September 29, 2008).

⁶ Raze Technologies, "The Advantages of TDD over FDD in Wireless Data Applications," September 7, 2001, 3, at http://www.three-g.net/3g_tdd_advantages.pdf.

⁷ Ibid., 3-4.

Technology conducted detailed studies of potential TDD interference in AWS-3 spectrum, concluding that

The interference analyses presented above are based on a static case where all of the elements are assumed to be fixed. Most importantly, even under these conditions, the analysis shows that an AWS-1 and AWS-3 device operating in close proximity does not necessarily result in interference. And when factoring in actual operation under non-static conditions, the situation only improves.⁸

T-Mobile's claims of interference have been shown to be specious and, under the circumstances, intended simply to provide a patina of false credibility to an attempt to exclude TDD technology and competitors that want to use that more efficient technology, from participating in the AWS-3 auction.

II. Combinatorial Bidding Has Significant Practical Shortcomings And Should Not Be Adopted for AWS-3.

A. Combinatorial Bidding Failed Miserably in Auction 73 and Produced Catastrophic Revenue Shortfalls Due to the Interaction of Combinatorial Bidding, Activity, Dropped Bid, Eligibility, and Minimum Acceptable Bid Rules.

While RTG's combinatorial bidding proposal fails to specify a specific rule set, it is reasonable to assume that it alludes to rules similar to those adopted for use in C Block in Auction 73. Those rules proved disastrous in their implementation in that auction, a fact which RTG recognized in its original filing in the AWS-3 rulemaking,⁹ but it has since repudiated that prudent judgment.

The intersection of the FCC's combinatorial bidding, activity, dropped bid, eligibility, and minimum acceptable bid rules in Auction 73 as described in Appendix 1

⁸ FCC, Office of Engineering and Technology, "Advanced Wireless Service Interference Test Results and Analysis," DA 08-2245A2, October 10, 2008, 16.

⁹ Comments of the Rural Telecommunications Group, Inc., WT Docket Nos. 07-195 and 04-356, July 24, 2008, 13.

of this paper created a disastrous reduction of auction revenue by nearly one half billion dollars, an outcome which strongly militates against adoption of combinatorial bidding rules for the AWS-III auction purely on arguments of economic efficiency. Specifically, in Auction 73, the FCC for the first time authorized combinatorial or package bidding the 700 MHz Upper C Block.¹⁰ Under Auction 73's combinatorial bidding rules, three packages were offered: Package 50 States (consisting of REAGs 001-008), Package Atlantic (consisting of REAGs 010 and 012), and Package Pacific (consisting of REAGs 009 and 011). Bidders could bid either on individual REAGs or a package in any round; the provisionally winning bid would be calculated in accordance with the rule:

For licenses in the C Block subject to HPB, the FCC Auction System will determine which combination of individual and package bids yields the highest aggregate gross bid amount, taking into consideration each bidder's highest bid on each license or package submitted up to that point in the auction. These bids become the provisionally winning bids for the round.¹¹

Thus, only if the total of the bids on all the individual REAGs in the package exceeded the bid on that package – in auction jargon, if the package were broken – could a bidder on an individual REAG in that package win that REAG. In other words, if a bidder wanted only one or two REAGs which were included in the Package 50 States, two conditions had to obtain: (1) the total amount of the bids on the eight REAGs in Package 50 States had to exceed the amount of the bid on the Package 50 States (i.e., the package had to be broken), and (2) the bidder had to have the high bid on that one or two REAGs.

¹⁰ "Second Order and Report," FCC 07-132, August 10, 2007, 118 (http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-07-132A1.pdf); "Auction of 700 MHz Band Licenses Scheduled for January 24, 2008," DA 07-4171, October 5, 2007, 39-41 (http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-07-4171A1.pdf).

¹¹ "Auction of 700 MHz Band Licenses Scheduled for January 24, 2008," DA 07-4171, October 5, 2007, 64.

As a result of these rules, Verizon Wireless was able to obtain the all of the REAGs in the continental footprint for nearly *half a billion dollars less* than its auction competitors had been willing to pay during earlier rounds of the auction. As I discuss more extensively in the appendix, Verizon's ability to acquire a substantial chunk of valuable spectrum complimentary to its existing business and at a significant discount was the unfortunate interaction of the combinatorial bidding, eligibility, dropped bid, and activity rules, which along with the procedure used by the FCC to calculate minimum acceptable bids, lead to a "perfect storm" that made such an inefficient outcome possible.

The experience of Auction 73 should make the FCC move with great trepidation when considering any proposal that calls for it to employ combinatorial bidding in any future auction. The combinatorial bidding rules it must establish must undergo significant changes in the eligibility, dropped bid, and activity rules as well as the method for calculating the minimum acceptable bids than those used in Auction 73. The evidence of Auction 73 also suggests that in a rule system as complex as that of the 700 MHz auction that the unintended consequences of rule changes can be viciously pernicious. It behooves the FCC to investigate extensively the potential effects of such rules changes, including extensive simulations. In Auction 73, the anonymous bidding rule effectively maximized auction revenue without collateral detriment, while the combinatorial bidding rule catastrophically reduced revenues by nearly half a billion dollars. For these reasons, combinatorial bidding should not be used in the upcoming AWS-III auction.

B. Combinatorial Bidding Is Pervious to Anti-Competitive and Economically Inefficient Blocking Strategies.

There is, however, an additional reason to avoid combinatorial bidding in AWS-3. Combinatorial bidding rules like those used in Auction 73 provide a potential blocking strategy to bidders who wish to preclude creation of a competing nationwide broadband network. The following thought experiment shows the problem. Suppose that there were an auction conducted under the combinatorial bidding rules used in Auction 73 with the exception that the alternatives are to bid on (1) a 50-state package nationwide license of 20 MHz or (2) licenses of 20 MHz for the 721 CMAs which collectively cover the same coverage area as the package. Suppose that the mean equilibrium price of the package at which, *ceteris paribus*, the package would clear is \$1.62 per MHz/pop (which happened to be the mean equilibrium price of B Block in Auction 73). Suppose further that a mean price of \$2.00 per MHz/pop constitutes a ceiling above which the package bidder i finds the cost of the spectrum economically prohibitive, i.e., bidder i cannot deploy the nationwide network if i has to pay on average that much for the spectrum. Now suppose that there is a bidder j in the auction who prizes the top five CMAs in population because of complementarities the spectrum offers to its existing system, but does not want to deploy a nationwide system. Suppose next that bidder j would be severely disadvantaged if the package bidder i prevails and reduces the bidder j 's market share by deploying a nationwide network. So long as the cost to bidder j is less than the loss incurred by the reduction of j 's market share by the deployment of i 's nationwide network, it is to j 's advantage to bid the mean equilibrium price of the 721 CMAs above i 's ceiling price. In the current example, that means doubling j 's original bids on the top five CMAs, resulting in a mean equilibrium price for the 721 CMAs of \$2.09 per MHz/pop, paying a mean premium of \$0.47 to block i from obtaining the spectrum and preventing

deployment of a nationwide network. In this example it would involve bidding an additional \$2,829,221,000 for the top five CMAs.

The exact numbers used in the example are only illustrative, because there is always a ceiling above which a bidder can bid on a subset of CMAs which makes deployment of a nationwide network economically infeasible at that cost for spectrum. The specific ceiling depends in large part on estimates of deployment costs and the package bidder's capitalization. *The key point from this exercise is that it is always economically rational for a would-be blocking bidder to bid for a desired subset of CMAs such that the total bid for all CMAs exceeds what would otherwise be the equilibrium price of the package so long as the premium that would-be blocker pays does not exceed the loss he incurs if the package bidder obtains the spectrum and deploys the nationwide network.* The problem is exacerbated by the fact that the blocker need risk no exposure for deploying a nationwide network in order to block a competitor from deploying one: this is the fundamental feature of combinatorial bidding. It becomes particularly vicious when the would-be blocker is an extremely well-capitalized incumbent (whose revenue is dependent on deployment in urban and suburban areas, while avoiding deployment in less lucrative rural areas) and the would-be package bidder is a less well-capitalized new entrant.¹²

While some of the underlying dynamic described here is intrinsic to any standard English auction, it is made particularly pernicious by combinatorial bidding's permitting of any sufficiently well-financed bidder with the appropriate incentives to block the

¹² Formalization of these arguments may be found in Gregory Rose, "Necessary and Sufficient Conditions for Emergence of a Blocking Strategy Equilibrium in Standard English Auctions with Combinatorial Bidding: Two Theorems and a Technical Note," technical paper, Econometric Research and Analysis, December 5, 2008.

emergence of a rival nationwide network without exposure to the risk of having to deploy such a network. If such a nationwide network is a compelling national interest, as the FCC clearly perceives it to be, then auctioning a single nationwide license is preferable to combinatorial bidding schemes because it spreads the same risk to potential blockers as to genuine entrants who wish to deploy such a network.

III. Allocation of AWS-3 Spectrum in CMAs Presents a Substantial Danger of Eliminating the Economies of Scale and Complementarities of a Single Nationwide License Without Compensatory Benefits.

RTG’s insistence that offering AWS-3 spectrum at the CMA level is essential to ensure that “new entrants, as well as small and rural auction participants, would not be precluded from participation the AWS-3 auction”¹³ is predicated on a fundamental misunderstanding of the reasons underlying the asymmetries of deployment and quality of service between rural and urban America. There is significant evidence that previous broadband auctions – the Lower 700 MHz Band auction (44, 49, 60), the AWS-1 auction (66), and the Upper 700 MHz Band auction (73) – have not only offered ample spectrum at the CMA and EA levels, but that rural bidders have been remarkably successful in obtaining broadband spectrum, as table 1 shows:

Table 1. Rural Bidder Performance in Broadband Auctions

Auction	Band	Percent of Licenses Obtained by Rural Bidders	Percent of Rural Bidders Obtaining at Least One License
44, 49, 60	Lower 700 MHz Band	31.49	70.00
66	AWS	17.20	56.25
73	Upper 700 MHz Band	10.10	48.18

¹³ Notice of *Ex Parte* Communication of Rural Telecommunications Group, Inc., WT Docket Nos. 07-195 and 04-356, December 3, 2008.

The majority of rural bidders bid on a single license while the number of rural bidders bidding on more than five CMAs in any auction is, on average, vanishingly small. Furthermore, rural bidders are seldom challenged by major incumbent providers except in those areas where predominantly rural CMAs are directly contiguous to major urban areas. The problem facing rural customers is not availability of quality spectrum or opportunity for rural providers to participate in broadband spectrum auctions. The problem is that the large incumbents with the resources to effectively deploy and provide relatively high quality of service tend to avoid predominantly rural areas because they are notoriously less lucrative as profit centers. The 2000 census reports that 79.22% of the U.S. population lives in urban areas, while only 20.78% live in rural areas. Examination of winning bidders by whether the CMA/EA/REAG is predominantly urban or rural shows that major incumbents have concentrated 96.24% of their bidding activity on urban areas. This is to be expected, since deployment in equally-sized urban and rural geographic areas will provide, *ceteris paribus*, almost 2.81 times more potential subscribers in urban areas than in rural for the same deployment cost. What governs the asymmetry in urban/rural deployment rates and quality of service is economic value. That is not to say that rural providers neither deploy nor attempt to provide quality service, but they are at a huge disadvantage because they are incapable of taking advantage of economies of scale and complementarities available to the major incumbents precisely because they are comparatively undercapitalized and operate in areas which perforce generate revenue streams significantly inferior to those available from the areas in which major incumbents predominantly deploy. RTG's proposal to auction a significant portion of AWS-3 licenses at the CMA level simply dooms existing

rural providers and similarly sized and capitalized new entrants to replicating their failure to provide high quality broadband service to rural America.

Conversely, offering a single nationwide license at auction for AWS-3 (1) with strict build-out requirements to ensure that rural areas are not systematically slighted as they have been hitherto and (2) with a sufficiently low reserve price to provide incentives for major incumbents to bid (in effect compensating them for the lower expected revenue stream from rural deployment) offers the best opportunity to attract either major incumbents with the resources to deploy in rural areas or new entrants sufficiently well capitalized to do so. The current policy of primarily allocating rural broadband spectrum to providers who are structurally and financially incapable of deploying high quality service in parcels too small to permit economically efficient enjoyment of economies of scale and synergistic complementarities has failed. It is time for the FCC to try something new.

Appendix 1

A Brief Review and Critique of Auction 73's Use of Combinatorial Bidding Rules

While RTG's combinatorial bidding proposal in the AWS-3 rulemaking fails to specify a specific rule set, it is reasonable to assume that it alludes to rules similar to those adopted for use in C Block in Auction 73. Those rules proved disastrous in their implementation in that auction, a fact which RTG recognized in its original filing on the matter, but it has since repudiated that prudent judgment.¹⁴

The intersection of the FCC's combinatorial bidding, activity, dropped bid, eligibility, and minimum acceptable bid rules in Auction 73 created a disastrous reduction of auction revenue by nearly one half billion dollars, an outcome which strongly militates against adoption of combinatorial bidding rules for the AWS-III auction. Specifically, in Auction 73 the FCC for the first time authorized combinatorial or package bidding only on the C Block.¹⁵ Under the combinatorial bidding rules there, three packages were offered: Package 50 States (consisting of REAGs 001-008), Package Atlantic (consisting of REAGs 010 and 012), and Package Pacific (consisting of REAGs 009 and 011). Bidders could bid either on individual REAGs or a package in any round; the provisionally winning bid would be calculated in accordance with the rule:

For licenses in the C Block subject to HPB, the FCC Auction System will determine which combination of individual and package bids yields the highest

¹⁴ Comments of the Rural Telecommunications Group, Inc., WT Docket Nos. 07-195 and 04-356, July 24, 2008, 13.

¹⁵ "Second Order and Report," FCC 07-132, August 10, 2007, 118 (http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-07-132A1.pdf); "Auction of 700 MHz Band Licenses Scheduled for January 24, 2008," DA 07-4171, October 5, 2007, 39 41 (http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-07-4171A1.pdf).

aggregate gross bid amount, taking into consideration each bidder's highest bid on each license or package submitted up to that point in the auction. These bids become the provisionally winning bids for the round.¹⁶

Thus, only if the total of the bids on all the individual REAGs in the package exceeded the bid on that package – in auction jargon, if the package were broken – could a bidder on an individual REAG in that package win that REAG. In other words, if a bidder wanted only one or two REAGs which were included in the Package 50 States, two conditions had to obtain: (1) the total amount of the bids on the eight REAGs in Package 50 States had to exceed the amount of the bid on the Package 50 States (i.e., the package had to be broken), and (2) the bidder had to have the high bid on that one or two REAGs.

In Round 17 of Auction 73 a high bid of \$4,713,823,000 on Package 50 States exceeded the reserve price. This bid was placed by Google Airwaves. A significant drop in Google's stock price in the following few days resulted in a decision by Google not to bid further; meeting the reserve price guaranteed that the open access conditions which Google had sought even if Google did not ultimately obtain the spectrum. This did not affect Google's eligibility until Round 26 because its package bid was provisionally winning until that round. However, the minimum acceptable bid rules, designed to encourage new bids, did kick in during the ten rounds in which Google's bid was provisionally winning because the package was unbroken, resulting in a steady decline of the minimum acceptable bid for any individual REAG in C Block. This would become a critical factor.

¹⁶ "Auction of 700 MHz Band Licenses Scheduled for January 24, 2008," DA 07-4171, October 5, 2007, 64.

In Round 26, as table 1 shows, QUALCOMM broke the package with a bid on REAG 004 which brought the sum of bids on individual REAGs to \$4,755, 823, exceeding Google’s package bid. Google then had three rounds in which to overbid this

Table 1. Breaking the Package

REA	Round						
	18	19	22	23	24	25	26
001	Alltel/604.624	604.624	604.624	604.624	604.624	604.624	604.624
002	MretoPCS/306.117	ATT/637.183	637.183	637.183	637.183	637.183	637.183
003	KingStreet/933.36	933.360	933.360	933.360	933.360	933.360	933.360
004	ATT/602.118	602.118	QUALCOMM/578.334	578.334	884.144	1,158.757	1,405.293
005	Bluewater/174.128	174.128	174.128	QUALCOMM/485.989	485.989	485.989	485.989
006	Bluewater/683.894	683.894	683.894	683.894	683.894	683.894	683.894
007	Copper Valley/1.906	1.906	1.906	1.906	1.906	1.906	1.906
008	SAL/2.799	2.799	2.799	2.799	2.799	2.799	2.799
Total	3,308.946	3,640.012	3,616.228	3,928.089	4,233.899	4,508.512	4,755.048
Package 50 States	4,713.823	4,713.823	4,713.823	4,713.823	4,713.823	4,713.823	4,713.823

amount for the package; it did not do so. This resulted in the individual REAGs defaulting to their minimum acceptable bids for any bidder who sought them. As a result, Verizon Wireless was able to place unchallenged winning bids on seven of the Package 50 States REAGs in Rounds 27-30.¹⁷

On REAG 001 (Northeast) Alltel had previously \$604,624,000, but anticipating that the package would not be broken, Alltel had allowed the bid to drop, resulting in the minimum acceptable bid falling to \$502,774,000 by Round 29, the round in which Verizon placed a winning bid at that minimum acceptable bid figure. On REAG 006 Bluewater Wireless had previously bid \$683,894,000 in Round 6, but, like Alltel, it

¹⁷ Verizon Wireless was challenged on REAG 007 by SAL Spectrum, LLC and Triad 700, LLC in Round 39; Triad 700, LLC prevailed in Round 40. Cox Wireless continued to bid on REAG 008 in Rounds 26-28, but did not challenge Verizon Wireless’ winning bid in Round 30.

assumed that the package would not be broken and it allowed the bid to drop, again initiating the decline of the minimum acceptable bid. Verizon won the license in Round 30 with a bid of \$319,798,000, which was \$364,096,000 less than Bluewater Wireless' bid.

Since dropped bids cannot be reinstated, Alltel and Bluewater Wireless were excluded from challenging Verizon for these two REAGs. However, even if the dropped bid rule were not in effect, a significant proportion of the potential challengers to Verizon were precluded from doing so once the package was broken because they lacked sufficient eligibility to make bids, as table 2 indicates.¹⁸

Table 2. Eligibility of Bidders When the Package Was Broken

Bidder	Eligibility at End of Round 26 in Bidding Units	Eligibility Required to Reinstate Lapsed Bids After Round 26	Eligibility Required for Bids Actually Placed After Round 26
<i>Alltel Corporation</i>	499,125.00	52,530,000.00	-
AST Telecom, LLC	30,200.00	13,000.00	13,000.00
AT&T Mobility Spectrum, LLC	102,108,000.00	77,381,000.00	-
<i>Bluewater Wireless, L.P.</i>	955,000.00	51,966,000.00	-
Cellco Partnership d/b/a Verizon Wireless	306,371,250.00	-	281,116,000.00
<i>Cellular South Licenses, Inc.</i>	10,147,500.00	28,742,000.00	-
CHEVRON USA INC.	37,500.00	22,000.00	-
Choice Phone LLC	67,875.00	49,000.00	49,000.00
Club 42 CM Limited Partnership	345,000.00	62,000.00	62,000.00
<i>Copper Valley Wireless, Inc.</i>	195,000.00	528,000.00	-
Cox Wireless, Inc.	11,706,125.00	1,185,000.00	1,185,000.00
<i>Cricket Licensee 2007, LLC</i>	0.00	110,098,000.00	-
Google Airwaves Inc.	287,371,000.00	281,116,000.00	-
<i>King Street Wireless, L.P.</i>	26,078,750.00	86,310,000.00	-
Kurian, Thomas K.	1,000,000.00	924,000.00	924,000.00
<i>MetroPCS 700 MHz, LLC</i>	5,686,250.00	88,597,000.00	-
<i>NatTel, LLC</i>	0.00	22,000.00	-
<i>PTI Pacifica, Inc.</i>	34,125.00	49,000.00	-
<i>Pulse Mobile LLC</i>	33,750.00	49,000.00	-
QUALCOMM Incorporated	185,310,000.00	28,742,000.00	28,742,000.00
SAL Spectrum, LLC	3,260,750.00	1,713,000.00	528,000.00
<i>SeaBytes, L.L.C.</i>	15,000.00	22,000.00	-
Small Ventures USA, L.P.	27,500.00	-	-

¹⁸ The eligibility rules were set out in "Auction of 700 MHz Band Licenses Scheduled for January 24, 2008," DA 07-4171, October 5, 2007, 35.

Triad 700, LLC	11,240,000.00	-	1,390,000.00
<i>Vulcan Spectrum LLC</i>	<i>6,768,750.00</i>	<i>51,966,000.00</i>	-
<u>Xanadoo 700 MHz DE, LLC</u>	<u>1,000,000.00</u>	-	<u>13,000.00</u>
<i>Lacked sufficient eligibility to bid on REAGs after Round 26</i>			

Thus, 46.15% of active bidders on REAGs in Block C lacked sufficient eligibility to reinstate bids (if the dropped bid rule were not in effect) or to place new bids on REAGs when the package was broken in Round 26.

Verizon’s success in C Block was in many respects a “perfect storm” interaction of the combinatorial bidding, eligibility, dropped bid, and activity rules with the procedure used by the FCC to calculate minimum acceptable bids, but it resulted in Verizon obtaining the two most populous REAGs for nearly half a billion dollars than competitors had been willing to pay earlier in the auction.

The experience of Auction 73 should make the FCC wary in employing combinatorial bidding in any future auction without significant changes in the eligibility, dropped bid, and activity rules and the procedure used by the FCC to calculate minimum acceptable bids. The results of Auction 73 also suggests that in a rule system as complex as that of the 700 MHz auction that the unintended consequences of rule changes can be viciously pernicious. It behooves the FCC to investigate extensively the potential effects of such rules changes, including extensive simulations. In Auction 73 the anonymous bidding rule effectively maximized auction revenue without collateral detriment, while the combinatorial bidding rule catastrophically reduced revenues by nearly half a billion dollars.